

U.S. Express il No.: EU265089271US
Attorney Docket No.: AM-3751

IN THE CLAIMS:

Please cancel Claims 47 - 49 without prejudice. Please amend Claims 35, 38, 40, 42 - 45, 50, and 52 as follows.

1 - 4. (Previously Cancelled)

C1 1/5. (Once Amended / Previously Amended) A method of etching a shaped cavity in a substrate, wherein initial etching of said shaped cavity is performed using an initial process chamber pressure, wherein continued etching of the shaped cavity is performed using a process chamber pressure that is at least 25% lower than said initial process chamber pressure, and wherein etching of said shaped cavity is followed by an etch finishing step, wherein said etch finishing step is performed using a process chamber pressure that is within a range of about 80% to about 100% of said initial process chamber pressure.

10/6. (Once Amended / Previously Amended) A method of etching a shaped cavity in a substrate, wherein the method comprises:

- a) an initial cavity etch step during which said substrate is etched to form a shaped cavity using an initial process chamber pressure;
- b) at least one additional etch step during which continued etching of said shaped cavity is performed using a process chamber pressure that is within a range of about 25 % to about 50 % lower than said initial process chamber pressure; and
- c) an additional etch step following step b), during which continued etching of said shaped cavity is performed using a process chamber pressure that is at least 40 % lower than the process chamber pressure used during the performance of step b).

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11 ~~7~~. (Once Amended / Previously Amended) The method of Claim ~~6~~¹⁰, wherein said etch step c) is performed using a process chamber pressure that is within a range of about 40% to about 50% lower than the process chamber pressure used during the performance of etch step b).

12 ~~8~~. (Original) The method of Claim ~~6~~¹⁰, wherein said method further comprises an etch finishing step, wherein said etch finishing step is performed using a process chamber pressure that is within a range of about 80 % to about 100 % of said initial process chamber pressure.

13 ~~9~~. (Once Amended / Previously Amended) The method of Claim ~~8~~¹², wherein said etch finishing step is performed using a process chamber pressure that is about 90% of said initial process chamber pressure.

C1 14 ~~10~~. (Once Amended / Previously Amended) The method of Claim ~~6~~¹⁰, or Claim ~~8~~¹², wherein said substrate comprises single-crystal silicon, and etching is performed using a plasma containing reactive fluorine species.

11. (Previously Cancelled)

15 ~~12~~. (Once Amended / Previously Amended) The method of Claim ~~10~~¹⁴, wherein said plasma source gas further comprises an additive gas selected from the group consisting of O₂, HBr, Cl₂, N₂, and combinations thereof.

16 ~~13~~. (Once Amended / Previously Amended) The method of Claim ~~6~~¹⁰ or Claim ~~8~~¹², wherein etching is performed using a plasma generated from a source gas comprising a gas selected from the group consisting of SF₆, CF₄, Cl₂, HBr, and combinations thereof.

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18 ~~14~~¹⁶. (Once Amended / Previously Amended) The method of Claim ~~13~~¹⁶, wherein said plasma source gas further comprises an additive gas selected from the group consisting of Ar, O₂, N₂, and combinations thereof, wherein said additive gas is provided in an amount sufficient to improve profile control during etching.

17 ~~15~~¹⁶. (Original) The method of Claim ~~13~~¹⁶, wherein said plasma source gas further comprises an essentially nonreactive, diluent gas selected from the group consisting of He and Xe.

19 ~~16~~¹⁸. (Original) The method of Claim ~~14~~¹⁸, wherein said plasma source gas further comprises an essentially nonreactive, diluent gas selected from the group consisting of He and Xe.

17 - 22. (Previously Cancelled)

9 20 ~~23~~¹⁰. (Once Amended / Previously Amended) The method of Claim ~~6~~¹⁰ or Claim ~~8~~¹², wherein said method includes performing the following steps prior to said initial cavity etch step: etching said substrate to a predetermined depth to form a shaped opening, then forming a conformal protective layer overlying at least a sidewall of said shaped opening, wherein said protective layer comprises a material having a different etch selectivity than said substrate

21 ~~24~~²⁰. (Once Amended / Previously Amended) The method of Claim ~~23~~²⁰, wherein said substrate comprises single-crystal silicon and said protective layer comprises silicon oxide.

25 - 26. (Previously Cancelled)

2 ~~27~~¹. (Previously Added) The method of Claim ~~5~~¹, wherein said substrate comprises single-crystal silicon, and etching is performed using a plasma containing reactive fluorine species.

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3 ~~28~~. (Previously Added) The method of Claim ~~27~~², wherein said plasma source gas further comprises an additive gas selected from the group consisting of O₂, HBr, Cl₂, N₂, and combinations thereof.

4 ~~29~~. (Previously Added) The method of Claim ~~3~~¹, wherein etching is performed using a plasma generated from a source gas comprising a gas selected from the group consisting of SF₆, CF₄, Cl₂, HBr, and combinations thereof.

6 ~~30~~. (Previously Added) The method of Claim ~~29~~⁴, wherein said plasma source gas further comprises an additive gas selected from the group consisting of Ar, O₂, N₂, and combinations thereof, wherein said additive gas is provided in an amount sufficient to improve profile control during etching.

C 5 ~~31~~. (Previously Added) The method of Claim ~~29~~⁴, wherein said plasma source gas further comprises an essentially nonreactive, diluent gas selected from the group consisting of He and Xe.

7 ~~32~~. (Previously Added) The method of Claim ~~30~~⁶, wherein said plasma source gas further comprises an essentially nonreactive, diluent gas selected from the group consisting of He and Xe.

8 ~~33~~. (Previously Added) The method of Claim ~~3~~¹, wherein said method includes performing the following steps prior to said initial cavity etch step: etching said substrate to a predetermined depth to form a shaped opening, then forming a conformal protective layer overlying at least a sidewall of said shaped opening, wherein said protective layer comprises a material having a different etch selectivity than said substrate.

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9 ~~34~~ (Previously Added) The method of Claim ~~33~~⁸, wherein said substrate comprises single-crystal silicon and said protective layer comprises silicon oxide.

22 ~~35~~ (Twice Amended / Presently Amended) A method of etching a shaped cavity in a substrate, wherein the method comprises:

a) an initial cavity etch step during which said substrate is etched to form a shaped cavity using an initial process chamber pressure; and

b) at least one additional etch step during which continued etching of said shaped cavity is performed using a process chamber pressure that is at least 25% lower than said initial process chamber pressure, wherein etching is performed using a plasma which consists generated from a source gas consisting essentially of chemically reactive species generated from SF₆ and Ar which are used in combination with species generated from an inert gas.

C1
Cust 24 ~~36~~ (Once Amended / Previously Amended) The method of Claim ~~35~~²², wherein said at least one additional etch step includes a first etch step which is performed using a process chamber pressure that is within a range of about 30% to about 50% lower than said initial process chamber pressure.

25 ~~37~~ (Once Amended / Previously Amended) The method of Claim ~~36~~²⁴, wherein said first etch step is performed using a process chamber pressure that is about 30% lower than said initial process chamber pressure.

26 ~~38~~ (Previously Added / Twice Amended / Currently Amended) ~~The method of Claim 37,~~
A method of etching a shaped cavity in a single crystal silicon substrate, wherein the method comprises:

a) an initial cavity etch step during which said single crystal silicon substrate is etched to form a shaped cavity using an initial process chamber pressure; and

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b) at least one additional etch step during which continued etching of said shaped cavity is performed using a process chamber pressure that is at least 25 % lower than said initial process chamber pressure, wherein etching is performed using a plasma generated from a source gas comprising SF₆ and Ar, wherein said at least one additional etch step includes a first additional etch step which is performed using a process chamber pressure that is within a range of about 30% to about 50% lower than said initial process chamber pressure, and wherein said at least one additional etch step further includes a second additional etch step during which continued etching of said shaped cavity is performed using a process chamber pressure that is at least 40% lower than the process chamber pressure used during the performance of said first additional etch step.

C1 27/38. (Previously Added / Once Amended / Previously Amended) The method of Claim 26, wherein said second additional etch step is performed using a process chamber pressure that is within a range of about 40% to about 50% lower than the process chamber pressure used during the performance of said first additional etch step.

28/40. (Previously Added / Once Amended / Currently Amended) ~~The method of Claim 35 or Claim 36 or Claim 39;~~ A method of etching a shaped cavity in a single crystal silicon substrate, wherein the method comprises:

a) an initial cavity etch step during which said single crystal silicon substrate is etched to form a shaped cavity using an initial process chamber pressure; and

b) at least one additional etch step during which continued etching of said shaped cavity is performed using a process chamber pressure that is at least 25% lower than said initial process chamber pressure, wherein etching is performed using a plasma generated from a source gas comprising SF₆ and Ar, and wherein, subsequent to said at least one additional etch step, an etch finishing step is performed using a process chamber pressure that is within a range of about 80% to about 100% of said initial process chamber pressure.

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²⁸
 29/41. (Previously Added) The method of Claim ~~40~~²⁸, wherein said etch finishing step is performed using a process chamber pressure that is about 90% of said initial process chamber pressure.

²⁶
 30/42. (Previously Added / Once Amended / Currently Amended) The method of Claim ~~35~~²⁶ or Claim ~~40~~²⁸, wherein said plasma source gas further comprises an additive gas selected from the group consisting of O₂, HBr, Cl₂, N₂, and combinations thereof.

²⁶
 31/43. (Previously Added / Once Amended / Currently Amended) The method of Claim ~~35~~²⁶ or Claim ~~40~~²⁸, wherein said plasma source gas further comprises an additive gas selected from the group consisting of Ar, O₂, HBr, Cl₂, N₂, and combinations thereof, wherein said additive gas is provided in an amount sufficient to improve profile control during etching.

Cl
 23/44. (Previously Added / Once Amended / Currently Amended) The method of Claim ~~35~~²² or Claim ~~42~~ or Claim ~~43~~, wherein said ~~plasma source~~ inert gas ~~further comprises an essentially nonreactive, diluent gas~~ is selected from the group consisting of Ar, He and Xe.

^{22, 26}
 32/45. (Previously Added / Once Amended / Currently Amended) The method of Claim ~~35~~^{22, 26} or Claim ~~40~~²⁸, wherein said method includes performing the following steps prior to said initial cavity etch step: etching said substrate to a predetermined depth to form a shaped opening, then forming a conformal protective layer overlying at least a sidewall of said shaped opening, wherein said protective layer comprises a material having a different etch selectivity than said substrate.

³³
 33/46. (Previously Added) The method of Claim ~~45~~³³, wherein said protective layer comprises silicon oxide.

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47. (Cancelled, Without Prejudice)

48. (Cancelled, Without Prejudice)

49. (Cancelled, Without Prejudice)

34/50. (Previously Added / Twice Amended / Currently Amended) ~~The method of Claim 48;~~

A method of etching a shaped cavity in a substrate, wherein the method comprises:

a) etching said substrate to a predetermined depth to form a shaped opening;

b) forming a conformal protective layer overlying at least a sidewall of said shaped opening, wherein said protective layer comprises a material having a different etch selectivity than said substrate;

c) an initial cavity etch step during which said substrate is etched to form a shaped cavity using an initial process chamber pressure; and

d) at least one additional etch step during which continued etching of said shaped cavity is performed using a process chamber pressure that is at least 25% lower than said initial process chamber pressure, wherein said at least one additional etch step includes a first additional etch step which is performed using a process chamber pressure that is within a range of about 30% to about 50% lower than said initial process chamber pressure, and wherein said at least one additional etch step further includes a second additional etch step during which continued etching of said shaped cavity is performed using a process chamber pressure that is at least 40% lower than the process chamber pressure used during the performance of said first additional etch step.

35/51. (Previously Added / Once Amended / Previously Amended) The method of Claim 50, wherein said second additional etch step is performed using a process chamber pressure that is within

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a range of about 40% to about 50% lower than the process chamber pressure used during the performance of said first additional etch step.

3652. (Previously Added / Once Amended / Currently Amended) The method of ~~Claim 47 or Claim 48 or Claim 50~~³⁴, wherein, subsequent to said at least one additional etch step, an etch finishing step is performed using a process chamber pressure that is within a range of about 80% to about 100% of said initial process chamber pressure.

cl at 3753. (Previously Added) The method of Claim ~~52~~³⁶, wherein said etch finishing step is performed using a process chamber pressure that is about 90% of said initial process chamber pressure.
